

ROYAL ASTRONOMICAL SOCIETY.

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November 9, 1849.

No. 1.

G. B. AIRY, Esq., President, in the Chair.

John Charles Dennis, Esq., 122 Bishopsgate Street, was balloted for, and duly elected a Fellow of the Society.

Vol. IX. of the *Monthly Notices* has been published during the Vacation. Its price is fixed by the Council at 2s. 6d. to fellows, and 5s. to the public. A copy is given to the *purchasers* of the corresponding quarto volume, which is now in the press.

The *Berliner Astronomisches Jahrbuch* for 1852 contains approximate Ephemerides of *Astræa*, *Hebe*, *Iris*, *Flora*, *Metis*, *Hygeia*, and *Neptune*, for 1850, for every ten days, and an exact Ephemeris for every day during the month of opposition. It is not, therefore, the intention of the Editor to print any similar Ephemerides after the present *Notice*, unless directed by the Council, or without some special grounds.

The Smithsonian Institution have published in a separate form "Appendix I. to Volume II. of the *Smithsonian Contributions to Knowledge*, an Ephemeris of *Neptune* for the date of the Lalande Observations of May 8th and 10th, 1791; and for the oppositions of 1846, 7, 8, and 9, computed for the Smithsonian Institution by Sears C. Walker, Esq." Copies have been presented with great liberality to most of the Astronomers of Great Britain and the Continent. There is still a spare copy or two for distribution, which will be given, on application, to any fellow who proposes to make use of it.

There is one copy of the "*Circular in Relation to the Astronomical Expedition to Chile*" still left for distribution. The object of this expedition is to determine the parallax of the sun, by corresponding observations of *Venus* and *Mars* at places which are distant from each other. As the observations for this purpose are of the most delicate kind, it is not desirable that they should be attempted with inferior instruments.*

* Attention is again called to the absolute necessity of measuring the diameter of the planet whenever observations are made to correspond with those of Lieut. Gilliss. See the present *Notice* for *Measures of the Diameter of Venus*.

Part of a Memoir by the President was read, giving a history of the foundation of the Cape Observatory. Many years ago, on the death of Mr. Fallowes, his papers were forwarded to the Lords of the Admiralty, who made some ineffectual attempts to have them examined and published, if expedient. It is needless to allude here to the various difficulties which presented themselves; it will be sufficient to state, that Mr. Airy recently took charge of these manuscripts, and is now arranging and preparing them for press. Their lordships, with their accustomed liberality, have agreed to Mr. Airy's recommendation, viz. that Mr. Fallowes' observations should be published in the *Memoirs* of the Royal Astronomical Society, and at the expense of the Admiralty. Mr. Airy has availed himself of his position as custodian of the papers of the late Board of Longitude (which are now stored at the Royal Observatory) to furnish an exact history of this important institution.

As only a portion of this Paper was read, no further mention will be made of it in the present *Notice*. The work will probably be published in the quarto Volume for 1850, and will doubtless prove an important addition to those gratuitous contributions with which the Astronomer Royal has frequently enriched our science, while he has preserved the labours of astronomers deceased from neglect or even total oblivion.

METIS.

Observations.

HAMBURG.		Meridian Circle.		(M. C. Rümker.)
1849.	Hamb. M.T.	R.A.	Dec.	
	h m s	° ' "	° ' "	
Aug. 20	12 25 22.0	335 31 44.8	-20 21 52.8	
25	12 0 52.9	334 19 9.0	20 51 4.5	
30	11 36 21.5	333 6 0.0	21 16 45.2	
Sep. 4	11 58.7	331 54 59.4	38 20.7	
5	11 7 7.8	41 12.4	42 8.4	
7	10 57 28.6	331 14 16.4	49 7.0	
9	47 52.5	330 48 8.0	21 55 15.1	
13	28 44.7	329 56 57.5	22 4 55.6	
15	19 32.3	329 36 45.0	8 46.3	
19	10 1 3.9	328 55 26.1	13 23.1	
20	9 56 30.7	46 6.7	14 5.9	
21	51 39.4	37 12.6	14 27.0	
23	43 1.5	20 38.7	14 35.6	
24	38 35.2	13 1.8	14 34.7	
25	34 10.7	328 5 51.5	14 7.2	
26	29 47.5	327 59 1.4	13 23.0	
27	25 26.4	52 43.1	12 43.7	
Oct. 1	9 8 20.3	327 32 1.3	-22 7 25.6	

LIVERPOOL.

8 $\frac{1}{2}$ -inch Achromatic.

(Mr. Hartnup.)

1849.	Greenwich M.T.			R.A.			N.P.D.			Comp ^d —Obs ^d .		Stars.	
	h	m	s	h	m	s	°	'	"	s	N.P.D.	B.A.C.	B.A.C.
Sep. 22	10	1	16.0	21	53	53.88	112	14	36.3	—0.46	—14.7	7724	
Oct. 14	8	27	57.4	49	2	71	111	30	30.6	—0.43	—18.0	7750, 7724	
20	8	5	36.2	50	16	92	111	4	8.4	—0.17	—15.9	—	—
21	8	1	58.8	50	35	70	110	59	14.2	—0.36	—15.7	—	—
28	7	37	24.0	21	53	32.63	110	21	4.1	—0.36	—13.1	—	—

“The places of the stars are taken from the Catalogue cited. The observed places are corrected for refraction and parallax. The computed places were deduced from Mr. Graham’s Ephemeris, published in the *Monthly Notices*, vol. ix. No. 8.”

Ephemeris at Greenwich Mean Midnight. By Mr. Graham.

1849.	R.A.			N.P.D.			1849.	R.A.			N.P.D.		
	h	m	s	h	m	s		h	m	s	h	m	s
Oct. 31	21	55	18.67	110	1	23.7	Dec. 1	22	24	1.81	105	54	48.5
Nov. 1	55	55	25	109	55	1.7	2	25	14.20		45	21.2	
2	56	33	31	48	32.7		3	26	27.42		35	49.0	
3	57	12	81	41	56.6		4	27	41.46		26	11.9	
4	57	53	74	35	13.8		5	28	56.30		16	29.9	
5	58	36	08	28	24.1		6	30	11.95	105	6	43.0	
6	21	59	19.80	21	27.5		7	31	28.37	104	56	51.4	
7	22	0	4.88	14	24.3		8	32	45.56		46	55.0	
8	0	51	31	109	7	14.4	9	34	3.49		36	53.8	
9	1	39	05	108	59	58.1	10	35	22.17		26	48.0	
10	2	28	10	52	35.4		11	36	41.58		16	37.6	
11	3	18	44	45	6.1		12	38	1.70	104	6	22.6	
12	4	10	04	37	30.5		13	39	22.52	103	56	3.1	
13	5	2	88	29	48.7		14	40	44.02		45	39.2	
14	5	56	94	22	0.7		15	42	6.20		35	10.8	
15	6	52	21	14	6.6		16	43	29.03		24	38.1	
16	7	48	65	108	6	6.4	17	44	52.51		14	1.1	
17	8	46	24	107	58	0.3	18	46	16.61	103	3	19.8	
18	9	44	97	49	48.3		19	47	41.34	102	52	34.4	
19	10	44	81	41	30.5		20	49	6.66		41	44.9	
20	11	45	74	33	6.9		21	50	32.58		30	51.3	
21	12	47	75	24	37.6		22	51	59.07		19	53.7	
22	13	50	79	16	2.8		23	53	26.11	102	8	52.2	
23	14	54	87	107	7	22.4	24	54	53.72	101	57	46.9	
24	15	59	94	106	58	36.6	25	56	21.85		46	37.8	
25	17	5	99	49	45.5		26	57	50.52		35	24.9	
26	18	13	01	40	48.9		27	22	59	19.71	24	8.2	
27	19	20	96	31	47.2		28	23	0	49.40	12	47.9	
28	20	29	84	22	40.1		29	2	19.59	101	1	24.1	
29	21	39	62	13	28.0		30	3	50.27	100	49	56.7	
Nov. 30	22	22	50.28	106	4	10.8	Dec. 31	23	5	21.44	100	38	25.8

1850.								1850.											
R.A.								R.A.											
h m s								h m s											
° ' "								° ' "											
Jan.	1	23	6	53	08	100	26	51	14	Feb.	14	0	20	20	96	91	14	35	14
	2		8	25	18		15	13	6		15		22	8	12	91	1	24	7
	3		9	57	75	100	3	32	4		16		23	55	55	90	48	13	3
	4		11	30	76	99	51	47	9		17		25	43	23		35	1	3
	5		13	4	23		40	0	1		18		27	31	17		21	48	8
	6		14	38	14		28	9	1		19		29	19	37	90	8	35	9
	7		16	12	48		16	14	8		20		31	7	82	89	55	22	6
	8		17	47	26	99	4	17	4		21		32	56	52		42	9	0
	9		19	22	44	98	52	17	0		22		34	45	47		28	55	2
	10		20	58	06		40	13	5		23		36	34	67		15	41	1
	11		22	34	08		28	7	0		24		38	24	12	89	2	27	0
	12		24	10	51		15	57	6		25		40	13	82	88	49	12	8
	13		25	47	31	98	3	45	4		26		42	3	77		35	58	7
	14		27	24	52	97	51	30	4		27		43	53	97		22	44	6
	15		29	2	10		39	12	7		28		45	44	42	88	9	30	7
	16		30	40	05		26	52	4	Mar.	1		47	35	12	87	56	17	0
	17		32	18	38		14	29	5		2		49	26	08		43	3	5
	18		33	57	06	97	2	4	0		3		51	17	29		29	50	3
	19		35	36	10	96	49	36	1		4		53	8	75		16	37	6
	20		37	15	48		37	5	9		5		55	0	47	87	3	25	3
	21		38	55	20		24	33	3		6		56	52	44	86	50	13	5
	22		40	35	26	96	11	58	6		7	0	58	44	67		37	2	3
	23		42	15	66	95	59	21	6		8	1	0	37	15		23	51	7
	24		43	56	37		46	42	5		9		2	29	89	86	10	41	9
	25		45	37	38		34	1	4		10		4	22	88	85	57	32	8
	26		47	18	70		21	18	3		11		6	16	12		44	24	6
	27		49	0	32	95	8	33	3		12		8	9	62		31	17	4
	28		50	42	22	94	55	46	4		13		10	3	37		18	11	2
	29		52	24	44		42	57	6		14		11	57	37	85	5	6	1
	30		54	6	99		30	7	1		15		13	51	61	84	52	2	1
	31		55	49	87		17	14	9		16		15	46	11		38	59	4
Feb.	1		57	33	06	94	4	20	9		17		17	40	85		25	58	1
	2	23	59	16	59	93	51	25	4		18		19	35	85	84	12	58	2
	3	0	1	0	41		38	28	3		19		21	31	09	83	59	59	7
	4		2	44	51		25	29	7		20		23	26	58		47	2	8
	5		4	28	90	93	12	29	7		21		25	22	30		34	7	6
	6		6	13	56	92	59	28	3		22		27	18	28		21	14	0
	7		7	58	50		46	25	6		23		29	14	49	83	8	22	3
	8		9	43	71		33	21	6		24		31	10	95	82	55	32	4
	9		11	29	22		20	16	4		25		33	7	66		42	44	4
	10		13	15	01	92	7	10	1		26		35	4	61		29	58	3
	11		15	1	08	91	54	2	8		27		37	1	81		17	14	4
	12		16	47	44		40	54	5		28		38	59	26	82	4	32	5
Feb.	13	0	18	34	07	91	27	45	4	Mar.	29	1	40	56	96	81	51	52	8

1850.	R.A.			N.P.D.			1850.	R.A.			N.P.D.		
	h	m	s	°	'	"		h	m	s	°	'	"
Mar. 30	1	42	54.90	81	39	15.4	April 9	2	2	48.66	79	35	7.9
31	44	53.11		26	40.2		10	4	49.48		23	9.4	
April 1	46	51.57		14	7.4		11	6	50.55	79	11	4.0	
2	48	50.30	81	1	37.0		12	8	51.88	78	59	1.7	
3	50	49.28	80	49	9.1		13	10	53.47		47	2.7	
4	52	48.53		36	43.8		14	12	55.32		35	6.9	
5	54	48.03		24	21.1		15	14	57.42		23	14.6	
6	56	47.80	80	12	1.0		16	16	59.77	78	11	25.7	
7	1	58	47.82	79	59	43.8	April 17	2	19	2.37	77	59	40.3
April 8	2	0	48.11	79	47	29.4							

1849.	Log. Δ	Hor. Par.	1849.	Log. Δ	Hor. Par.	1850.	Log. Δ	Hor. Par.
Oct. 31	0.26541	"	Dec. 2	0.34156	"	Jan. 3	0.40280	"
Nov. 1	.26793	4.63	3	.34372	3.89	4	.40444	3.38
2	.27045		4	.34587		5	.40606	
3	.27296		5	.34801		6	.40767	
4	.27547		6	.35013		7	.40926	
5	.27797	4.52	7	.35223	3.81	8	.41084	3.33
6	.28047		8	.35432		9	.41239	
7	.28295		9	.35639		10	.41394	
8	.28543		10	.35845		11	.41546	
9	.28790	4.42	11	.36049	3.74	12	.41697	3.28
10	.29036		12	.36251		13	.41846	
11	.29282		13	.36452		14	.41994	
12	.29526		14	.36651		15	.42140	
13	.29769	4.32	15	.36849	3.67	16	.42284	3.24
14	.30012		16	.37045		17	.42427	
15	.30253		17	.37239		18	.42568	
16	.30493		18	.37431		19	.42707	
17	.30732	4.23	19	.37622	3.61	20	.42845	3.20
18	.30970		20	.37811		21	.42981	
19	.31206		21	.37998		22	.43115	
20	.31442		22	.38184		23	.43248	
21	.31676	4.14	23	.38368	3.55	24	.43379	3.16
22	.31908		24	.38550		25	.43509	
23	.32139		25	.38730		26	.43637	
24	.32369		26	.38909		27	.43763	
25	.32598	4.05	27	.39086	3.49	28	.43888	3.12
26	.32825		28	.39262		29	.44012	
27	.33051		29	.39436		30	.44134	
28	.33275		30	.39608		31	.44254	
29	.33497	3.97	31	.39778	3.43	Feb. 1	.44373	3.09
30	.33718		1850. Jan. 1	.39947		2	.44490	
Dec. 1	0.33938		2	0.40114		3	0.44606	

Observed Diameters of Venus.

	Log. Δ	Hor. Par.	1849.	Log. Δ	Hor. Par.	1850.	Log. Δ	Hor. Par.
Feb. 4	0.44720	"	Mar. 1	.47098	2.90	Mar. 26	.48617	"
5	.44833	3.06	2	.47174		27	.48661	
6	.44944		3	.47249		28	.48704	
7	.45054		4	.47324		29	.48746	2.79
8	.45163		5	.47396	2.88	30	.48786	
9	.45269	3.02	6	.47468		31	.48826	
10	.45374		7	.47538		April 1	.48864	
11	.45478		8	.47606		2	.48901	2.78
12	.45581		9	.47674	2.86	3	.48937	
13	.45682	3.00	10	.47740		4	.48971	
14	.45781		11	.47804		5	.49005	
15	.45879		12	.47867		6	.49037	2.77
16	.45975		13	.47929	2.85	7	.49068	
17	.46070	2.97	14	.47990		8	.49098	
18	.46163		15	.48049		9	.49126	
19	.46256		16	.48107		10	.49154	2.77
20	.46346		17	.48164	2.83	11	.49180	
21	.46435	2.94	18	.48220		12	.49205	
22	.46523		19	.48274		13	.49229	
23	.46609		20	.48327		14	.47251	2.76
24	.46694		21	.48379	2.82	15	.49273	
25	.46778	2.92	22	.48429		16	.49293	
26	.46859		23	.48478		April 17	.49312	
27	.46940		24	.48525				
Feb. 28	0.47020		Mar. 25	0.48572	2.80			

"The ellipse is still assumed to be invariable. The calculated places have been corrected for observation, and they are referred to the apparent equinox.

"This ephemeris will enable observers to follow the planet as long as there is the smallest chance of seeing it."

Observed Diameters of Venus.

LIVERPOOL.

20-foot Equatoreal.

(Mr. Lassell.)

1849, March 16.24	28.675	} Mean 28.866.
	29.130	
	28.753	
	28.995	
	28.775	

Aperture contracted to 20 inches, parallel wire-micrometer by Merz ; magnifying power, 366.

"The observations were taken in daylight in order to avoid any error from irradiation, and also that the planet might be seen as near the meridian as practicable.

"Air very tremulous, though not more so than is usual under such circumstances. The edge of *Venus*, however, was sharp between the vibrations. The cusps equal in sharpness. No well-ascertained spots or markings visible."

1849, March 21.216	30.619	} Mean 30.589.
	30.748	
	30.431	
	30.721	
	30.425	

Measures taken with somewhat more difficulty than on the 16th ; same power and aperture.

LIVERPOOL. $8\frac{1}{2}$ -inch Achromatic. (Mr. Hartnup.)

	Parallel-wire Micrometer.				Double-image Micrometer.			
	G.M.T.	Diameter.	Obs.	Power.	G.M.T.	Diameter.	Obs.	Power.
1849.	^h ^m	["]			^h ^m	["]		
Feb. 27	6 31	24.66	10	400	6 56	23.38	10	261
28	5 10	24.69	10	180	5 40	23.62	10	261
April 30	5 53	55.42	20	180	5 33	55.84	20	261
Oct. 19	22 0	14.47	20	180	23 42	13.36	20	261

DURHAM. Fraunhofer Equatoreal. (Rev. R. A. Thompson.)

Wire Micrometer.				
	Mean of 10 Measures.	Greatest Measured Value.	Least Measured Value	
1849. April 19	7 ^h 6 ^m	49".43	50".00	48".82
Double Image Micrometer.				
	7 ^h 36 ^m	48".90	49".33	48".38

Observed Diameters of Saturn.

DURHAM. Fraunhofer Equatoreal. (Rev. R. A. Thompson.)

Double Image Micrometer.				
1848 Aug. 31	12 ^h 30 ^m 13 ^h 0 ^m	Eq. Diam. = 18".76 Polar = 17".09	Means of 10 Measures of each.	

Satellites of Uranus. Observations by Mr. Lassell.

Satellite I.

	Greenwich M.T.	Position.	Obs.	Distance.	Obs.
1849.	^h ^m	^o [']		["]	
Sept. 17	14 15	189 49	2		
	13 40			30.67	3
19	13 54	132 32	2		
	14 6			25.51	3
Oct. 13	11 15	196 18	3		
	12 35			28.35	4

Satellite II.

	Greenwich M.T.	Position.	Obs.	Distance.	Obs.
1849.	^h ^m	^o [']		["]	
Sept. 17	14 20	147 53	2		
	13 55			43.07	3
19	13 48	87 0	3		
	14 15			28.90	3
Oct. 13	11 37	167 9	3		
	12 1			45.42	4

Sept. 17. II. is rather the brighter; atmosphere unfavourable.

A suspected satellite, very faint and difficult to measure, was observed the same day.

At 14^h 40^m G.M.T. Posⁿ 11° 44': 14^h 30^m G.M.T. Dist. = 20".5.

Lassell's Satellite of Neptune. Observations by Mr. Lassell.

	Greenwich M.T.	Position.	Obs.	Distance.	Obs.	Power.
1849.	^h ^m	[°] [']		"		
Sept. 19	10 10.2	20 26	4			366
	10 25			8.86	1	—
Oct. 13	8 40	36 17	3			—
Nov. 3	8 16.4	218 6	4			—
	8 37.1			16.44	4	—

Sept. 19. Positions carefully taken, but with difficulty. The distance extremely difficult.

Oct. 13. Sky hazy.

Nov. 3. Sky indifferent, measures difficult; but, from the care employed and the advantage of a recently applied clock motion, considered to be equal in value to former measures taken in more favourable circumstances.

Goujon's Comet. Observations by Mr. Lassell.

	Greenwich M.T.	R.A. Star—Comet.	N.P.D. Star—Comet.	No. Obs.
1849.	^h ^m ^s	^m ^s	" "	
Sept. 19	8 51 59.5	0 57.87		9
	8 51 37.9		0 5.7	9
22	8 41 35.5	—0 33.54		7
	9 1 27.3		—2 28.2	9

"Since the above I have taken several favourable opportunities of looking for the comet, without success. Being situated, as it is, in so bright a portion of the Milky Way that the field was constantly filled with stars from the fifth magnitude downward, I scarcely expected that I should distinguish it. The field of the telescope was as bright as twilight."

Mean Places for Jan. 1, 1849, of Stars compared by Mr. Lassell with Goujon's Comet.

LIVERPOOL.			Equatoreal.		(Mr. Hartnup.)
Day of Comp. with Comet.	Mag.	Mean R.A.	Mean N.P.D.	No. Obs.	Stars on which these Places depend. B.A.C.
1849.		^h ^m ^s	[°] ['] ["]		
Sept. 11	6	18 9 8.19	28 51 5.4	2	6079, 6289, 6500
17	8½	28 41.15	31 14 36.6	3	
19	8½	35 13.56	32 7 7.1	3	
22	8½	18 43 4.58	33 25 32.4	2	

*Observations of Gambart's (Biela's) Comet. By T. Maclear, Esq.
Her Majesty's Astronomer at the Cape of Good Hope.*

"The observations of this comet were made with the 46-inch achromatic by Dollond, mounted on its old equatoreal stand, and armed with a position-micrometer, by Simms, having three flat wires instead of spider-lines. Two of these wires are parallel and moveable by micrometer screws, one revolution of which is equal to 44".5315 of a great circle. The third is fixed and perpendicular to the moveable wires. The breadth of each wire is about 19".

"The moveable wires were adjusted parallel to the equator by causing stars near the equator to describe a narrow space between their proximate edges.

"No artificial light was used in observation, except for the purpose of counting the revolutions: this was managed by rotating the small illuminating reflector on the axis of its support.

"The telescope being clamped, the differences in right ascension were the differences in time between the disappearances behind the fixed wire, corrected for the rate of the chronometer; and the apparent differences in declination were measured by placing one or other of the edges of one moveable wire on the apparent centre of the star, and the centre of the other moveable wire on the centre of the comet. The edges were placed on the centre of the star in alternate order, generally, to eliminate the breadth of the wire. When time and distance permitted, both objects were measured by the same screw, and in all cases, as near as possible to the fixed wire.

"This comet is perhaps the most interesting on record, on account of the appendage, which was probably a portion of the original mass. The observations of the appendage are distinguished by the letter *a*. After the 25th of February this body was compared occasionally with the principal mass. These comparisons are given by themselves; they are somewhat uncertain because there was no obvious centre to select for the wire, and the outline was very faint. After the 18th of March no measures of it were attempted.

"The heading to each column is sufficiently explicit. The numbers in the columns, R.A., N.P.D., express *geocentric* positions; viz. the observed positions corrected for parallax and refraction. For the computation of parallax the distances stated in the *Nautical Almanac* for 1849, page xvi. &c. were employed.

"The last column gives the initials of the observer. W. M. denotes William Mann; H. C., Hubert Campion, R.N.; T. M., Thomas Maclear.

"A Catalogue is added containing the positions of the stars compared with the comet, all of which, excepting two, were determined by the 10-foot transit instrument and 6-foot mural circle. Nos. 14 and 15 were observed with the 46-inch equatoreal instrument, erected in the year 1847, by the method of differences. The star is identified by its number. The positions are the mean places January 1, 1846, and the precessions refer to the same epoch.*

Date.	No.	Cape M.T.	R.A.	N.P.D.	Obs.
1846.		h m s	h m s	° ' "	
Feb. 18 (a)	1	8 40 34.3	2 12 52.98		6 W. M.
	...	40 44.8	13 3.54		6
(a)	...	55 2.7		95 15 21.6	4
	...	58 38.0		20 43.3	4
19 (a)	2	27 6.9	2 17 58.02		6 W. M.
	...	27 17.6	18 8.80		6
	...	43 1.5		95 36 5.1	4
(a)	...	8 43 34.4		30 32.4	10

* Mr. Maclear has sent his observations in fuller detail than they are given here; all the *results* are published, and in case of doubt the original papers can easily be referred to.

Observations of Gambart's (Biela's) Comet.

Date.	No.	Cape M.T.	R.A.	N.P.D.	Obs.
1846.		h m s	h m s	° ' "	
Feb. 19 (a)	2	9 5 22.2	2 18 6.12		4 W. M.
...	...	9 5 33.1	18 17.15		4
20 (a)	3	8 7 23.5	2 23 7.72		6 W. M.
...	...	7 34.4	23 18.64		6
(a)	...	21 44.2		95 45 59.1	6
...	...	24 51.2		51 43.3	6
25 (a)	4	35 3.8	2 51 1.81		8 H. C.
...	...	8 35 19.2	51 17.30		8
(a)	...	9 13 41.6		97 11 15.4	8
...	...	9 18 20.0		18 33.9	8
26	5	8 38 30.4	2 57 14.99		8 H. C.
...	...	8 59 16.8		97 36 3.4	8
...	...	9 16 15.6	57 24.50		8
Mar. 1	6	50 13.0	3 16 14.25		3 T. M.
...	...	9 50 16.3		98 32 40.0	3
4	10	8 21 59.6	3 35 47.50	99 29 40.0	3 T. M.
...	9	8 23 26.1	35 48.03	29 40.7	4
...	9	9 14 47.3	36 2.28	30 26.4	6
...	10	9 14 47.3	36 1.77	30 22.0	6
...	9	10 10 54.6	36 17.60	31 1.1	2
...	10	10 10 54.6	36 17.81	30 58.0	2
5	11	8 56 4.5	3 42 53.54		2 T. M.
...	12	8 56 4.5	42 53.79		2
...	14	8 56 4.5	42 54.71		2
...	11	9 14 23.4	42 57.44		2
...	12	9 14 23.4	42 56.75		2
...	14	9 43 7.3	43 6.74	99 49 45.3	8
...	14	10 10 8.7	43 14.85	50 20.9	2
...	15	10 10 8.7	43 14.10	50 28.0	2
6	16	7 52 46.1	3 49 41.98	100 8 6.8	6 T. M.
...	17	8 26 50.0		8 48.1	10
...	...	9 19 44.9	50 6.07		15
...	...	42 59.0		9 34.9	5
...	...	43 50.1	50 12.98		11
...	...	9 49 29.1		9 43.8	4
...	...	10 16 29.6		9 43.3	6
...	...	17 6.9	50 22.72		11
...	...	10 31 29.9		9 53.6	2
Mar. 7	18	7 52 11.0	3 56 54.85		4 T. M.
...	19	7 53 36.6	56 54.55		5
...	...	8 24 9.8		100 27 35.9	12
...	...	8 32 25.2	57 6.97		9
...	18	9 45 15.5	57 32.42		4
...	19	9 55 7.0	3 57 32.20	100 28 58.2	8

Observations of Gambart's (Biela's) Comet.

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Date. 1846.	No.	Cape M.T. h m s	R.A. h m s	N.P.D. ° ' "	Obs.	
Mar. 8	20	7 59 25.3	4 4 19.20	100 46 43.7	6	T. M.
	...	8 36 6.9	4 30.81	47 5.1	8	
	21	8 36 6.9	4 30.96	47 5.2	8	
	20	9 15 23.8	4 43.94	47 42.3	10	
	21	15 23.8	4 43.97	47 36.8		10
	20	50 43.9	4 54.15	47 54.3	6	
	21	9 50 50.2	4 55.13	46 56.5	4	
	20	10 21 1.1	5 3.35		10	
	20	10 42 48.0		48 38.0	4	
9	22	7 41 59.0	4 11 47.18		5	T. M.
	...	7 54 12.5		101 6 36.5	6	
	...	8 10 3.8	11 56.15		6	
	...	46 42.4		6 57.5	6	
	...	8 58 5.4	12 11.82		6	
	...	9 11 6.6		7 15.1	6	
	...	30 11.9	12 22.32		6	
	...	43 34.3		7 46.7	6	
	...	9 57 22.4	12 31.11		6	
10	23	8 10 40.1	4 19 39.73		6	T. M.
	24	10 40.1	19 39.18		6	
	23	42 33.8	19 49.10	101 24 41.9	8	
	24	8 48 30.0	19 50.31	24 40.7	6	
	23	9 29 9.7	20 3.02		9	
	24	29 9.7	20 2.81		9	
	23	31 11.5		25 19.2	8	
	24	9 31 11.5		25 20.4	8	
	24	10 24 44.9	20 20.07	25 55.1	8	
11	25	8 18 18.2	4 27 30.16		14	T. M.
	...	8 21 50.7	27 31.47	101 42 28.2	12	
	...	9 5 5.6	27 46.19	43 3.0	10	
	26	10 1 54.0	28 4.35	43 49.8	10	
	25	10 35 35.5		44 14.3	2	
12	27	8 13 4.9	4 35 27.51		6	T. M.
	...	33 17.7		102 0 24.6	8	
	...	8 34 26.4	35 34.03		10	
	...	9 27 41.8	35 51.82	1 2.8	12	
	...	10 1 39.2	36 3.34	1 30.3	6	
13	28	8 0 58.6	4 43 29.02	102 17 3.2	12	T. M.
	29	0 58.6	43 28.72	17 4.2	12	
	28	52 24.4	43 46.56	17 40.0	10	
	29	8 52 24.4	43 46.32	17 41.2	10	
	28	9 35 32.4	44 0.87	18 7.9	10	
	29	9 35 32.4	44 0.60	18 8.8	10	
Mar. 14	30	8 40 38.1	4 51 54.56	102 34 6.0	8	H. C.

Date. 1846.	No.	Cape M.T. h m s	R.A. h m s	N.P.D. ° ' "	Obs.
Mar. 14	30	9 8 55.8	4 52 5.20	102 34 17.7	8
	...	9 47 36.5	52 18.27	34 38.8	8
15	32	7 52 4.2		102 48 28.6	2 T. M.
	...	7 52 7.3	4 59 58.98		3
	...	8 24 38.0	5 0 11.15	48 57.0	4
	...	8 59 3.1	0 22.06		6
	31	9 1 19.8	0 22.84		4
	31	8 20.9	0 26.40		3
	32	8 20.9	0 26.17		3
	...	27 56.5		50 0.0	8
	...	39 35.0	0 36.64		6
	...	47 31.8		50 18.7	6
	...	9 55 58.7	0 42.22		5
17	33	8 8 3.8	5 17 2.34		6 T. M.
	...	11 38.6		103 17 55.2	4
	λ	30 25.7	17 10.26	17 58.1	2
	...	8 30 25.7	17 10.59	18 0.0	2
	...	9 0 58.4	17 21.17	18 23.0	12
	...	9 42 16.6	17 35.92	18 37.0	12
	...	10 13 34.0	17 46.74	18 58.3	9
18	34	7 49 10.6	5 25 31.64		6 T. M.
	...	7 58 59.7		103 30 35.3	6
	...	8 10 48.1	25 39.35		4
	...	8 35 27.6	25 47.70	30 55.1	8
	36	8 35 27.6	25 47.69	30 51.9	8
	...	9 15 3.8	26 2.59	31 12.8	10
	35	9 45 47.2	26 13.13	31 25.8	10
	36	10 7 35.1	26 21.25	31 39.6	6
19	37	7 42 45.2	5 34 9.28	103 42 15.0	12 T. M.
	...	8 22 5.7	34 23.37	42 29.6	8
	...	9 41 42.9	34 52.29	43 8.9	10
20	38	8 32 16.9	5 43 10.01	103 53 25.4	10 H. C.
	39	8 32 16.9	43 10.10	53 17.2	10
	38	9 43 38.9	43 35.05	53 50.9	10
	39	9 43 38.9	43 35.18	53 48.8	10
21	40	8 20 26.1	5 51 50.35	104 2 44.3	6 T. M.
	41	42 8.8		2 49.0	4
	41	8 48 23.0	52 1.34		4
	42	9 7 14.9	52 7.40	2 56.5	4
	41	38 3.5	52 18.64	3 8.1	10
	42	9 38 3.5	52 18.75	3 7.4	10
	41	10 22 41.5	52 34.63	3 26.8	10
	42	10 22 41.5	5 52 34.52	3 29.0	10
Mar. 23	43	8 9 4.8	6 9 16.02	104 18 5.6	4 T. M.

Date. 1846.	No.	Cape M.T.			R.A.			N.P.D.			Obs.	
		^h	^m	^s	^h	^m	^s	[°]	[']	["]		
Mar. 23	44	8	9	4.8	6	9	16.35	104	18	8.3	4	T. M.
	43	8	29	5.3		9	24.03		18	3.2	2	
	43	9	6	53.3		9	37.80		18	20.6	12	
	44	9	6	53.3		9	37.62		18	19.9	12	
	43	10	8	59.8		9	59.03		18	35.8	12	
	44	10	8	59.8		9	59.28		18	36.0	12	
	24	45	8	38 2.7	6	18	10.21				5	T. M.
		46		38 2.7		18	10.31				5	
		46		49 21.6				104	23	52.8	4	
		45	8	55 59.2					23	48.3	4	
	45	9	20	26.3		18	27.05				6	
	45		23	20.9					23	56.9	4	
	46	9	37	3.5		18	33.07		24	5.7	4	
	45	10	6	10.0		18	43.43		24	5.3	4	
	45		33	24.5		18	53.39		24	22.2	6	
	46	10	53	23.9		19	0.04		24	17.1	6	
	26	46 bis	8	30 57.4	6	35	28.79				4	H. C.
	...		48	3.0							12	
	...	8	59	53.7		35	38.72				13	
	...	9	14	20.8							2	
	...	9	33	12.8		35	51.32				10	
	27	47	8	14 57.5	6	43	58.68				10	T. M.
	...		8	30 26.8				104	33	50.0	10	
	...	9	6	21.9		44	16.30				10	
	...	9	35	13.5					33	45.0	10	
	...	10	13	2.4		44	40.84		33	56.4	10	
	48	10	13	2.4		44	41.16		34	0.1	10	
	28	49	8	2 5.7	6	51	22.80	104	34	47.8	4	H. C.
	49	9	14	12.2					34	53.7	8	
	49		16	57.3		52	50.01				10	
	50		22	38.8					34	52.0	6	
	50	9	25	16.0		52	52.21				7	
	49	10	25	45.6		53	12.75		34	52.9	10	
	50	10	25	45.6		53	12.01		34	41.2	10	
	29	51	8	55 48.0	7	1	5.11	104	34	35.7	10	T. M.
	52		8	55 48.0		1	5.07		34	38.0	10	
	51	10	8	8.2		1	27.92		34	38.4	8	
	52	10	8	8.2		1	28.09		34	45.5	8	
	Mar. 31	54	8	36 20.2	7	17	23.40	104	31	9.8	8	T. M.
		54	9	15 58.1		17	37.34		31	2.6	6	
	53		32	39.8		17	44.32				2	
	54		32	39.8		17	44.46				2	
	53		37	38.2		17	44.47				3	
	54		37	38.2		17	44.56				3	

Observations of Gambart's (Biela's) Comet.

Date. 1846.	No.	Cape M.T. h m s	R.A. h m s	N.P.D. ° ' "	Obs.	
Mar. 31	53	9 51 53.9		104 30 54.4	8	T.M.
	54	10 6 8.2		31 4.0	8	
	53	18 33.0	7 17 57.78		6	
	54	18 33.0	17 57.41		6	
	54	10 31 21.4		30 55.3	5	
April 2	55	8 2 49.1	7 33 3.69		4	T. M.
	...	8 59 13.5	33 24.83		11	
	...	9 24 18.9		104 23 46.0	6	
	...	9 37 23.6	33 38.19		7	
	3	56	7 48 53.6	7 40 43.73	4	T. M.
	57	7 48 53.6	40 43.78		4	
	56	8 9 51.4		104 19 50.9	2	
	57	9 51.4		19 50.2	2	
	56	19 49.0	40 54.40		5	
	57	19 49.0	40 54.67		5	
	56	43 15.2	41 1.93		2	
	57	43 15.2	41 2.35		2	
	56	53 51.6	41 6.76		8	
	57	8 53 51.6	41 7.13		8	
	56	9 19 2.0	41 14.63	18 36.6	2	
	57	9 19 2.0	7 41 15.06	104 18 36.1	2	

Differences in Right Ascension and North Polar Distance of the two Comets. The smaller one precedes, and is to the north of the larger.

Date.	Obs.	Cape M.T. h m s	Diff. R.A. s	Diff. N.P.D. ' "
Feb. 26	6	9 23 48.4	15.40	
	8	9 31 4.3		6 53.2
Mar. 3	2	7 48 11.7	17.55	7 39.7
	5	7 49 50.3	23.31	7 20.5
17	4	7 44 23.0	40.37	
	3	7 51 43.2		9 8.0
18	3	7 33 4.1	36.43	
	2	7 37 17.9		8 52.1

Mean Places of the Stars, for January 1, 1846, compared with Gambart's (Biela's) Comet.

No.	Mag.	R.A. h m s	Ann. Prec. s	Obs.	N.P.D. ° ' "	Ann. Prec. "	Obs.
1	7	2 11 56.71	+3.006	4	95 3 25.3	-16.82	4
2	9	17 24.21	2.999	4	26 49.0	16.55	5
3	9	22 44.72	2.992	5	43 7.7	16.28	5
4	8	51 55.74	2.955	4	97 13 51.9	14.67	4
5	10	2 56 48.03	2.948	4	97 28 1.0	14.37	3
6	8	3 15 46.53	2.923	6	98 20 14.3	13.17	9
7	8	29 17.86	2.898	4	99 17 6.7	12.25	3
8		31 54.73	2.901	1	0 47.8	12.07	2
9	8	3 32 44.14	+2.891	5	99 32 30.6	-12.01	2

No.	Mag.	R.A.		Ann. Pre.	Obs.	N.P.D.		Ann. Pre.	Obs.
		^h	^m ^s			[°]	['] ["]		
10	7 $\frac{1}{2}$	3	38 31.39	+2.888	7	99	29 36.2	-11.60	10
11	8 $\frac{1}{2}$		39 12.15	2.879	6		55 29.3	11.56	4
12	8 $\frac{1}{2}$		39 26.60	2.880	4		52 4.3	11.54	3
14	10		42 53.59	2.881			43 6.7	11.29	
15	7		46 29.32	2.879		99	42 52.4	11.03	
16	6		49 14.89	2.868	8	100	12 8.8	10.83	5
17	8		50 15.60	2.869	5		8 54.5	10.75	5
18	10		56 53.92	2.858	4		27 23.7	10.25	1
19	7	3	59 40.87	2.858	14		24 43.5	10.05	6
20	9	4	4 50.96	2.846	6		51 55.5	9.65	5
21	7		6 10.45	2.847	7		46 56.7	9.55	7
22	8 $\frac{1}{2}$	12	15.94	2.840	9	100	58 11.5	9.08	6
23	9	18	43.97	2.824	5	101	31 27.4	8.57	6
24	7	20	31.76	2.824	9		28 23.6	8.43	5
25	8 $\frac{1}{2}$	28	13.44	2.811	6		53 40.0	7.81	4
26	7 $\frac{1}{2}$	29	9.52	2.818	4	101	35 4.5	7.74	5
27	8 $\frac{1}{2}$	34	36.95	2.806	7	102	0 38.3	7.29	5
28	8	42	30.43	2.795	6		18 53.1	6.65	7
29	7 $\frac{1}{2}$	44	30.33	2.797	7		12 45.6	6.48	7
30	6	4	52 46.48	2.780	10		46 7.5	5.79	10
31	7	5	0 14.93	2.780	11		41 41.9	5.16	6
32	7		0 41.78	2.777	7	102	47 43.0	5.13	5
Leporis λ	7 $\frac{1}{2}$	12	28.87	2.760	5	103	20 25.3	4.12	2
33	7 $\frac{1}{2}$	18	33.59	2.760	12		16 13.9	3.60	7
34	9	25	16.25	2.757	5		20 15.9	2.02	6
35	8 $\frac{1}{2}$	26	35.89	2.749	4		38 37.6	2.91	5
36	9	26	51.16	2.755	5		24 1.8	2.88	6
37	8	33	42.00	2.745	7		46 3.9	2.29	5
38	9	41	26.47	2.745	7		42 36.9	1.62	6
39	8	44	32.65	2.742	4	103	50 51.0	1.35	4
40	8	50	45.75	2.732	9	104	13 52.3	0.80	6
41	8 $\frac{1}{2}$	51	49.17	2.732	6		13 26.2	0.71	5
42	9	5	53 20.26	2.737	5		1 40.9	-0.58	5
43	8	6	8 56.40	2.728	10		22 54.1	+0.79	5
44	8	11	34.97	2.730	5		18 13.6	1.02	5
45	7 $\frac{1}{2}$	18	1.29	2.728	11		25 20.6	1.58	5
46	7 $\frac{1}{2}$	18	10.27	2.730	3		20 2.8	1.59	5
46 bis	8	34	47.43	2.730	7				
47	8	43	46.44	2.729	8		33 56.7	3.81	5
48	8 $\frac{1}{2}$	46	29.82	2.734	6		25 4.1	4.05	3
49	8 $\frac{1}{2}$	51	0.63	2.730	7		37 4.7	4.43	5
50	7 $\frac{1}{2}$	52	2.04	2.727	7		45 20.8	4.52	5
51	8	6	58 32.07	2.732	7		38 32.2	5.07	5
52	8	7	3 20.06	2.737	7		31 12.1	5.48	5
53	8 $\frac{1}{2}$	17	4.73	2.745	9		26 35.9	6.63	5
54	8	18	4.49	2.743	5		35 4.2	6.71	7
55	8 $\frac{1}{2}$	33	28.14	2.758	6		17 29.5	7.96	5
56	8 $\frac{1}{2}$	40	21.21	2.759	8		24 27.4	8.51	5
57	8 $\frac{1}{2}$	7	41 54.68	+2.764	4	104	14 0.6	+8.63	4

Occultations of Fixed Stars observed at Ashurst, near Dorking.
By Robert Snow, Esq.

Lat. $51^{\circ} 15' 58''$ North; Long. $1^{\text{m}} 10^{\text{s}}$ West.

5-feet Equatoreal.

Date. 1849.	Star's Name.	Immersion, Sid. Time. h m s	Limb.	Emersion, Sid. Time. h m s	Limb.
May 5*	95 Virginis	13 17 55.4	Dark		
7†	η Libræ	14 16 38.6	Bright	15 35 53.6	Dark.
Sep. 5	ν Piscium	21 29 24	Bright	22 10 23	Dark.
8‡	θ^2 Tauri	22 20 0	Bright	22 47 51	Dark.
—	80 Tauri	22 37 5	Bright		
—	81 Tauri			23 46 52	Dark.
—	85 Tauri			0 23 44	Dark.
Oct. 5	θ^2 Tauri	7 22 5.3	Bright		

* Star well seen, moon very bright, and nearly full.

† η Libræ emerged close to two illuminated lunar summits, which appeared to have suddenly become triple.

‡ θ^2 Tauri was, at immersion, first seen in *contact* with the moon's bright limb at $22^{\text{h}} 19^{\text{m}} 44^{\text{s}}$. Moon's limb very tremulous. Before the star finally disappeared, it suffered projection for $3^{\text{s}} \pm$, being then just wholly within the moon's limb.

Appearance of Saturn's Ring, &c. in the Equatoreal of Cambridge, United States. By Professor Bond.

"During the period of the disappearance of *Saturn's* ring in 1848, we often noticed breaks or inequalities in the ring, such as would arise from irregularities in its structure, were the matter of which it is composed unequally distributed in its different parts.

"Something of this kind has often before been observed, but hitherto only on the *illuminated* side of the ring. That similar appearances present themselves also on the *unilluminated* side is a new feature, important in its bearing on the true explanation of these phenomena.

"From June to September 1848 the light reflected from the edge of the ring (the only part then visible), instead of being uniformly distributed over a single line, was interrupted on each side of the planet by spaces of some seconds in breadth, where it was barely possible to trace the continuity of the edge. These inequalities were sufficiently abrupt to render it difficult to distinguish at first sight between them and the somewhat similar effects produced by either of the small satellites being projected upon the ring; their presence could only be detected by their motion, of which the indications were usually decisive in 15 or 20 minutes. On the other hand, the irregularities of the ring always retained one fixed position with reference to the ball, as long as the earth remained elevated above the *southern unilluminated* surface.

"The same appearances were again presented between September

and January 1849, while the earth was elevated above the *northern unilluminated* surface, in all this time retaining one fixed position with respect to the ball.

"It is an unavoidable inference from our observations that these breaks in the illumination of the edge do not rotate about the globe of *Saturn*; a result perfectly in accordance with what Schroeter has established with regard to the corresponding irregularities on the *illuminated* side.

"The fact of these inequalities always retaining one unaltered position may be explained without precluding the possibility of a rapid rotation of the rings, by attributing them to the reflexion of the solar rays from their inner edges. There seems to be no other way of accounting for their being seen on both surfaces, both when illuminated and when turned away from the sun.

"The first reappearance of the ring took place between August 31^d.78, Greenwich M. T., and Sept. 3^d.80; the second disappearance between Sept. 12^d.80 and Sept. 13^d.62; and the final reappearance in 1849 between Jan. 18^d.47 and Jan. 19^d.43.

"On two or three occasions in the past year we have enjoyed the sight of all the eight satellites at once.

"Our observations for a year or two past on the variations of the brightness of *Jupiter's* satellites afford some curious results. Attention was first drawn to the subject in observing a transit of the third satellite on the 6th of January, 1847. A few minutes after its entrance the satellite was visible on the disc just within the limit of the planet, being brighter than the surrounding surface; soon after a dark spot, supposed to be the satellite, could just be discerned in its place. The telescope used was an achromatic of $2\frac{3}{4}$ inches aperture, of excellent quality, but not powerful enough to enable us to decide whether or not the spot was really the satellite.

"On the 28th of January, 1848, during the transit of the shadows of the first and third satellites, the third satellite itself was seen with the great refractor under very beautiful definition, as a black spot between the two shadows, and not to be distinguished from them except by the place it occupied. It was smaller than its shadow in the proportion of 3 to 5, not duskish simply, but quite black like the shadows. On the 11th of March it was again seen dark on the disc, smaller than its shadow.

"On the 18th of March we watched the entire transit. At the first internal contact the satellite was distinctly seen on the disc, *brighter* than *Jupiter*, though it had entered on a bright channel south of one of the great equatoreal belts; 20 minutes after it had become nearly of the same brightness with the planet, so as to be barely perceptible, yet still whiter than the surrounding surface. While watching it with close attention, a minute dark speck suddenly made its appearance in the place of the satellite, increasing very rapidly till it occupied a space of about one second of arc in diameter, quite black and nearly round, though an irregularity of shape was suspected. Remaining thus for about two hours, the darkness gradually lost its intensity, and quite disappeared before

the satellite left the disc. Something of this nature we have always observed to accompany a transit of this satellite. The first and fourth satellites we have also seen black or dusky on the disc, but the former has once or twice crossed without our detecting any change. The spots are always less than the shadows, but have appreciable diameters, and make their appearance after the entrance of the satellite upon the limb of *Jupiter*. Changes of relative brightness are constantly going on; the feeblest, on the average, being the fourth, and the brightest usually the third.

"It would be well, as soon as *Jupiter* reaches a convenient position, say during the ensuing winter and in the spring of 1850, for observers generally to record their estimates of the relative brightness of the satellites as often as possible. The labour of doing this will be but trifling, and may lead to the discovery of the laws of these singular phenomena.

"We have observed Schweitzer's comet twice since its reappearance.

"From the circles of the great equatoreal compared with B. A. C. No. 1634, we have:—

Cambridge M. T.				Comet's R.A. 1849°0.			Comet's Decl. 1849°0.		
1849.	h	m	s	h	m	s	°	'	"
Aug. 24	15	37	30	4	45	0·4	— 27	14	14
26	15	38	42	4	41	5·4	— 27	17	45

"With the micrometer we have the following places:—

Cambridge M. T.									
1849.	h	m	s	Comet follows * in			Comet N. of * by		
Aug. 24	15	37	30	in	°	34·75	7	'	36·5
26	15	38	42	precedes *	by	3 20·35	N. of *	by	4 5·7

* is Lacaille 1613, whose place seems to be erroneous in N. P. D.

"The star Lalande 9167, of the 7·8 magnitude, is missing."

The Astronomer Royal exhibited an instrument for performing arithmetical multiplications and divisions, constructed under the direction of William Bell, Esq., Coronation Road, Bristol. The President remarked, that for mere exhibition of the significant figures produced by a single multiplication or division, to a certain degree of accuracy, nothing could be more convenient than the common sliding rule containing two similar scales, one fixed and the other moveable, in which the lengths corresponding to the numbers represented are the logarithms of those numbers corresponding to a certain modulus. In the scales of this kind in common use at the Royal Observatory, the distance from 1 to 10 upon the scale is about 12 inches; and with these dimensions, a product or quotient will be accurate, with the roughest degree of attention, to $\frac{1}{300}$ part; an accuracy which suffices for a vast amount of the small calculations in an observatory. And with proper scales for trigonometrical functions, the problems of plane and spherical trigonometry can in most cases be easily solved. These inconveniences, however,

attend it: 1st. It cannot be conveniently applied to multiply three or more quantities, or in general to exhibit a product of even two which is given in a different denomination; as when a sine is given by the product of two tangents: this failure, however, may usually be remedied by the use of two parallel sliders. 2dly. When used to multiply numbers, it gives no information as to the place of the decimal point in the product. It is to remove some of these inconveniences, but especially the last, that Mr. Bell has constructed his instrument.

The logarithmic spaces in Mr. Bell's machine are arranged upon a circle, a single series of numbers from 1 to 10 occupying the entire circumference. This construction, as is well known, may be used in the same way as the common sliding rule; but, like it, it gives no information as to the decimal point. But the revolving circle is connected by toothed wheel-work with two smaller circles, each of which performs one revolution for ten revolutions of the principal circle, and each of which has upon its circumference ten series of logarithmic numbers. These small circles, then, give us the means of defining the decimal place, in multiplicand, in multiplier, and in product. Thus, the successive figures 1 upon one circumference may stand for .00001, .0001, .001, .01, .1, 1, 10, 100, 1000, 10000. The rotating index of each circle is adjustable; there are also adjustable indices on the fixed frame. Suppose, then, we had to multiply 27.42 by 332.6, we should, both in the principal circle and in one of the smaller circles, set the 1 of the moveable circle or index to 27.42 on the fixed circle; but there would be this difference, that on the principal circle we have no respect to the decimal point, whereas on the smaller circle we should set to the 2742 following the 10. Then for 332.6 we should turn the principal circle from 1 to 3326, but we should also turn it two complete revolutions, which would carry the index of the second small circle from 1 to the 3326 following 100. Then the figures of the product will be exhibited very accurately on the principal circle, and much less accurately on the first of the small circles, but they would be found in that series of numbers which follows 1000, and the place of the decimal point would thus be exactly defined.

For the multiplication of three or more numbers, it is necessary to plant moveable indices after performing the first products; this process, however, is much less convenient than that with two sliding scales in the sliding rule.

The Astronomer Royal remarked, that in his opinion this construction is too expensive and too cumbrous to be extensively used. But he wished much to call the attention of members of the Society to the use of the sliding rule, and to the peculiar defect which he had indicated; and to represent to them the great value of any simple construction which, while preserving the other advantages of the sliding rule, would effectually remove that defect.

Mr. Drach suggests that a calculating machine, exhibited by Mr. F. Schiereck in 1837 (the construction of which was concealed by the inventor, who wanted 700*l.* for his secret), might probably

be a particular modification of the sliding rule applied to a circular form. He also suggests the addition of other concentric circles to Mr. Bell's scale, in which the trigonometric or other logarithmic numbers might be laid down.

The Astronomer Royal gave an oral statement of the progress made by Lord Rosse in the mounting of his 6-feet speculum.

In a lecture delivered on this subject by the Astronomer Royal in November 1848, a detailed account was given of the distortions produced in the speculum by using the telescope at different inclinations to the horizon, and of the explanation of these distortions suggested by Lord Rosse, and also of the nature of the remedial measures tried by Lord Rosse while the Astronomer Royal was at Parsonstown. It will be sufficient to recall here, that when the edge of the speculum rested against short iron pillars fixed in the breech-piece of the telescope, the firm hold produced by friction of the edge of the speculum on the pillars, combined with the varying elasticity of the triangular lever-supports in different inclinations of the telescope, produced distortion of the mirror; and that when, to avoid this friction, the mirror was suspended (as regarded its edge-bearing), either by a semicircular hoop or by a chain, a small difference in the edgewise pressure, depending on a difference of inclination of the telescope, threw some of the points of the supporting levers out of bearing, and distortion of the mirror was produced. This latter fault arose from the circumstance that the mirror could not slip freely over the points of the supporting levers. To remedy this, the following arrangement is now made. Each of the plates resting on the 27 supporting points, instead of being partially attached to the mirror by a layer of felt and pitch, is completely separated from it, to the distance of about $1\frac{1}{4}$ inch, and the speculum rests upon each plate by 3 turned brass balls at the three angles of the plate; so that the whole surface of the speculum is now supported by 81 brass balls. Each of these balls has a fine wire, passing through a small hole in the plate, and kept in tension by a weak spring on the opposite side; this prevents the ball from rolling away when the mirror is detached, but allows entire freedom of motion to the ball, to the extent of about 1 inch in any direction. Lord Rosse has reason to think that this construction is perfectly successful for its object. He has already found that the speculum may be moved laterally half an inch without the smallest discoverable distortion. Before the balls were used, when the speculum was moved laterally $\frac{1}{30}$ of an inch, vision was destroyed.

Lord Rosse thinks it, however, desirable to arrange the edgewise support, so that as little as possible may be trusted to the motion of the balls. The lower semicircle of the edge is now to be grasped by a strong iron hoop, very neatly fitted to it; and the upper semicircle is to have a thin hoop furnished with a drawing-screw or contracting screw, merely for the purpose of bringing the strong hoop constantly into fair contact with the edge of the mirror. And the ends of the strong hoop (which are at the extremity of a hori-

zontal diameter of the mirror) are to be supported by rods, attached to a horizontal bar which rests on the two upper pillars of the breech-piece, with the utmost freedom of motion; so that the mirror will be supported edgewise by jimbals of the most perfect construction. Lord Rosse hopes that, with this arrangement, in combination with the support on the balls already described, the mounting of the mirror will be sensibly perfect.

Lord Rosse had also communicated to the Astronomer Royal some remarks upon the process of grinding large mirrors. With mirrors of 3 feet aperture there is not the smallest difficulty. In the mirrors ground and polished by his apparatus, there is no appreciable difference of focal length of the central part and the annulus next the edge; and this result is obtained uniformly. Still, with the 6-feet mirrors there is great difficulty. In all cases, a figure is obtained which will do well for work; rarely is one obtained which is perfectly satisfactory. This arises in part from the impossibility of testing the mirror while it is under the machine.

Adverting to Mr. Lassell's use of a wooden polisher, Lord Rosse had stated to the Astronomer Royal, that he himself had at first used a wooden polisher, but that he had abandoned it, as there appeared to be abundant evidence that the polisher was continually changing its figure from the absorption of moisture. He considers it totally inadmissible for very large specula. It will, however, probably be necessary, with Mr. Lassell's apparatus, to use a light wooden polisher, because it appears scarcely practicable in that apparatus to apply a counterpoise.

In speaking of the results of observations with the large telescope, Lord Rosse had stated to the Astronomer Royal that the nebula H. 131 exhibited a well-marked spiral structure, and that 2241 has a central hollow.

In the *Monthly Notices*, vol. ix. p. 214, line 34, Mr. Hartnup has thrown out a suggestion that the indifferent rate of chronometers, W. Shepherd, 222 & 230 (fitted with Mr. Hartnup's new balance), might be due to mal-position during trial (the maker had left pins at the bottom projecting below the base rim).

Since the publication of that number, the Editor of the *Monthly Notices* has, by the favour of the Astronomer Royal, been permitted to inspect the arrangements of the chronometer-room at Greenwich, and to see the various contrivances adopted there to give every chronometer a proper *assiette*, whatever the form of the base may be. The Editor is now convinced that Mr. Hartnup's hypothesis is not tenable, and he takes some blame to himself for not inquiring into the matter before publication.*

The heliometer by the Brothers Repsold, of Hamburg, has been erected at the Radcliffe Observatory, and is now undergoing

* Chronometer-makers, who send their timekeepers to Greenwich for trial, should give them as wide a base as the case will allow, and take previous care to make them rest soundly on the base rim when placed on a flat surface. This would save trouble, and prevent possible misapprehension.

the careful scrutiny of Mr. Johnson. Upon so very delicate and complicated an instrument, no *positive* opinion can well be formed until the observer has thoroughly mastered its manipulation, and ascertained the degree of consistency of its results. Mr. Johnson has already found that it can be directed and read off with facility, (the illumination of the scale at the object glass is successfully obtained by a wire heated by powerful magnets,) and that the images of all stars, except the brightest, are round and free from wings when seen through the halved glasses. An instrument of such optical perfection can scarcely fail, in the hands of so delicate and scrupulous an observer as Mr. Johnson, to prove a most powerful engine in carrying on a large and very important class of investigations which have hitherto not been sufficiently attended to in this country, for want of means.

W. S. Jacob, Esq., F.R.A.S., and late Captain in the Bombay Engineers, has been appointed to the Observatory at Madras by the Hon. Court of Directors. As an amateur observer, Capt. Jacob's zeal and talents have been already amply shewn in the publications of this Society. He has now a wide field for distinguishing himself and his patrons, the East India Company.

Professor Wackerbarth states, on Mr. J. M. Kemble's authority (Saxons in England), that the Saxon yard was about one-tenth longer than the modern yard, or that 100 Saxon yards = 110 English yards. The value of the Saxon yard is so nearly identical with the metre, 1·0936 yards, that the Professor is inclined to suggest the possibility of the Saxon yard being actually derived from a former measure of the earth, made at a period beyond the range of history, the results of which have been preserved during many centuries of barbarism.

*Some Remarks on Falling Stars by Mr. Lowe.**

Mr. Lowe gives the following epochs when falling stars are said to be abundant:—

April 22 ^d to 25 ^d	Nov. 12 ^d to 14 ^d
July 17 .. 26	Nov. 27 .. 29
Aug. 9 .. 11	Dec. 6 .. 12

To which he adds from his own observation, Oct. 16^d to 18^d. There are many occurrences in January, but the days do not appear to be fixed.

Mr. Lowe then states by whom observations have been made at the foregoing epochs, and when and where.

The August epoch has been observed every year since 1841, and is said by Mr. Lowe to be the most certain.

The November epoch, 12^d to 14^d, seems also well fixed, but has in late years been surpassed by the August epoch in brilliancy.

* Further particulars will be found in the forthcoming Report of the British Association, "Catalogue of Observations on Luminous Meteors," by Professor Powell; and "Some Remarks on Luminous Meteors," by E. J. Lowe, Esq.

The epochs, Nov. 27^d–29^d, and Dec. 6^d–12^d, are somewhat doubtful, so far as Mr. Lowe's observations extend.

The October epoch has been observed in 1843, 4, 6, 7, and 8, but has not, so far as Mr. Lowe knows, been usually considered an epoch.

On referring back the paths of meteors, it is found that a considerable number diverge from the same point in the heavens; thus, during the July period of the present year, and up to the 9th of August, the paths of the meteors, if produced backwards, would nearly meet at a point to the east of α *Cygni*.

In 1848, of 80 meteors seen on August 19th, the paths of 55 were recorded; 23 came from *Cygnus*, 26 from *Cassiopeia*, and 6 were discordant. In 1847 out of 13, 5 came from *Cygnus* and 8 from *Cassiopeia*. This is confirmed by other observers. It seems very probable that this divergence was merely apparent, and that the meteors were nearly parallel to each other.

On the 16th of August last, Mr. Lowe was surprised to see a number of very small meteors, but brilliant for their size (being only the apparent size of the smallest fixed star on a clear night), which moved more slowly, and occupied a smaller portion of the heavens than on the 10th. He attributes this difference to their greater distance.

On the 10th of last August Mr. Lowe observed that out of 55 meteors there were 11 cases in which one star followed another in the same track nearly, and after an interval varying from 2 minutes to 15 seconds. When a meteor follows another in the same path, it has invariably been noticed that it also moves with the same speed. From this circumstance, together with the fact that such meteors are frequently very different in size, it may be supposed that the two bodies are connected. If this be so, then a meteor at 10^h 29^m had two attendants. This suggestion, if confirmed, would also shew that these bodies are material.

Mr. Lowe conceives that in our present state of knowledge of these curious appearances, we might conveniently arrange them in three classes.

- 1st. Falling stars, which leave luminous streaks behind them.
- 2d. Stars which do not leave such streaks.
- 3d. Luminous bodies, with defined discs.

The first probably shine by inherent light, for otherwise it is difficult to account for a luminous streak which lasts several seconds (in some cases even minutes) after the meteor itself has disappeared. The second may shine by reflected light, as described by Sir John Lubbock, and the third are probably atmospheric, as they chiefly move in discordant paths, are various in shape, and not unfrequently change colour.

On the 8th of last August, at 10^h 16^m, a meteor of a conical form, about twice the apparent size of a star of the first magnitude, moved slowly in a horizontal direction from ζ *Boötis*, about 1° below *Arcturus* (it left numerous sparks in its track). Here it suddenly disappeared, and re-appeared in about 1^s and

about $1^{\circ}\frac{1}{2}$ further on. Thus it had moved in the same track, though invisible. On its reappearance it was neither so large nor so brilliant as before, and gave the impression of a body moving rapidly and nearly directly *from* the observer. It was orange-red, and was visible about 5^s besides the time of disappearance. The length of its path after its reappearance was about 3° . The disappearance might be accounted for by supposing the meteor to shine by borrowed light, and to have passed through the umbra of some solid body. Sir John Lubbock suggests that it may have passed through the shadow of the earth.

At Castle Lecky, Newtown-Linawady, County of Londonderry, Mr. Webb saw (Nov. 1^d, at 11^h P.M.) in the north, a descending meteor, which having fallen a considerable distance in an inclined straight line, diverged suddenly (to the west) on approaching towards a dense cloud. The meteor described a curved path, concave to the cloud, by which it was evidently diverted, and then disappeared.

ERRATUM.

Vol. IX. p. 221, *Ceres*, July 13, Comp^d—Obs^d R.A., for $+12^{\circ}56'$ read $+11^{\circ}56'$.